TRAINING EFFECTIVENESS OF PPPPTK MATHEMATICS BASED ON TEACHERS' PERFORMANCE AND IMPLEMENTATION OF TEACHERS' CONTINUOUS PROFESSIONAL DEVELOPMENT

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Abstract

This study aims to measure the effectiveness of training program that is conducted by PPPPTK Mathematics, which is viewed from teachers' Continuous Professional Development performance and after-training implementation of continuous professional development (CPD). The results of this research are as follows: (1) the effective level of the training programs before and after the programs are improved as shown by the improvement of mean score before the training (50.530) and after training (79.920); (2) the paired sample t-test shows that there is a significant difference in teachers' Continuous Professional Development performance before and after the training programs; (3) the result of the structural model testing indicates that the model for program evaluation is fit (chi-square result is 4.998 which is relatively small, RMSEA less than 0.08 (0.063), CFI more than 0.9 (0.995), GFI more than 0.9 (0.940), AGFI more than 0.9 (0.988), and probability 0.172 which shows that there is no difference between the sample and the population covariant.

Keywords: effectiveness, teachers' performance, teachers' continuous professional development

INTRODUCTION

Education and training on increasing the competence for educators (teachers') is important to do with the development of training programs according to the needs of teachers' Continuous Professional Development and the development of science. This is in line with the statement of Darling-Hammond & Hammerness (2005: 390-441), that "training should pay attention to the needs of teachers' Continuous Professional Development with their ability as teachers' Continuous Professional Development and educators, not just to provide theoretical ability".

Center for the Development and Empowerment for Teachers and Education Personnel *(PPPPTK)* Mathematics is one of the Technical Implementation Unit *(UPT)* of Ministry of Education and Culture *(Kemendikbud)*. The task of *PPPPTK* Mathematics based on Regulation of Education and Culture Minister (Permendikbud) number 16 year 2015 on Organization and Working Procedure of *PPPPTK* is to carry out the development and empowerment of educators and education personnel according to their field. One of the functions of *PPPPTK* Mathematics is to facilitate the improvement of competence, such as through education and training for teachers' Continuous Professional Development and other education personnel (supervisors, principals, and labors).

In the Regulation of Minister of Administrative Reform and Bureaucratic Reform *(Permenpan and RB)* number 16 year 2009, the credit score and the position of teachers are mentioned that every activity, which is undertaken by teachers should be able to support the improvement of its performance as a professional educator. The main task of teachers are to educate, teach, guide, direct, train, assess, and evaluate learners on early childhood education in formal education, primary education and secondary education.

Professional Development (CPD) for teachers, as described in Minister of Administrative Reform and Bureaucratic Reform (*Permenpan and RB)* number 16 year 2009 is the development of teachers' competence that are carried out in accordance with the needs, which are gradually and continuously to improve their professionalism. This is in line with the purpose of CPD (Continuous Professional Development) that is proposed by Friedman et al. (2000: 5-7), that: (1) CPD emphasizes the maintenance of knowledge and skills, (2) CPD enhances and broadens knowledge and skills in order to support future professional development, and (3) the development of individual CPD qualities is required for supporting the implementation of tasks in work or profession.

Based on the description above, then the existence of *PPPPTK* as Technical Implementation Unit (*UPT)* of Ministry of Education and Culture (Kemdikbud) is still needed an effort to improve the quality of educators, especially for teachers, who are in position (on-the job). Therefore, every effort to improve the competence of educators and education personnel through training programs needs to remain associated with the Continuous Professional Development (CPD). Gardner (1978: 2-3) hopes that CPD can be integrated into both informal and incidental learning, because the strategy is a part of actual practice, or more precisely is called performance-based learning.

This research is conducted in order to know the effectiveness of *PPPPTK* Mathematics training program through teachers' performance and teachers' continuous professional development (CPD) activities after following the training.

LITERATURE REVIEW

Program Evaluation

In the introduction and evaluation plans for the Performance Accountability Report of Government Agencies *(LAKIP)* Year 2010 is stated that the evaluation function does not stand alone, but as part of the management function (planning, organizing, monitoring, and controlling). It can be concluded that evaluation is part of the management system. This is in line with Sonnichsen (1994: 539), who states that: "... builds the image of evaluation as an integral component in the administration and management of an organization," that evaluation is an integral component of the administration and management of an organization.

Implementation of evaluation activities or programs of government agency is the task of public officials, so that in order to complement the various functions of an organization's management, evaluation is very useful to prevent the organization for not repeating the same mistakes in carrying out its functions. According to introduction and evaluation plans of

LAKIP (2010: 1), evaluation is required, among others, because: (a) it is a management function, (b) it is a feedback mechanism for improvement, (c) it will prevent the organization from repeating the same mistake, and (D) it will be able to find and recognize the various problems that exist within the organization, and can also be used to find out the solution.

Program evaluation can be said as the monitoring and adjustment processes that are desired by evaluators in determining or improving program quality (Royse, Thyer, et al., 2006). Evaluation shows how well the program works and provides the way to improve it. Royse also states that program evaluation aims to know if the program is designed, implemented and beneficial to the parties involved in the program. In its implementation, the program evaluation intends to seek as much information as possible to get an overview of program design and implementation. Information gathering procedures on program evaluation should be tailored to the paradigm and evaluation approach that is used.

Continuous Professional Development (CPD)

The Regulation of the Minister of Administrative Reform and Bureaucratic Reform *(Permenpan and RB)* number 16 year 2009, on the credit score and the position of teachers indicates that for teachers' promotion and teachers' level, is needed to evaluate teachers' performance *(PKG).* Assessment of teachers' performance is the assessment of each item of the main tasks of teachers in order to foster the career and the rank of their position.

Based on Minister of Administrative Reform and Bureaucratic Reform *(Permenpan and RB)* number 16 year 2009, the meaning of Continuous Professional Development (CPD) is the development of teachers' competence that is carried out as needed, gradually and continuously to improve their professionalism. Continuous Professional Development for teachers includes three activities: (a) Self-development, (b) Scientific publications, and (c) Innovative works.

Kolb (1984:4) shows that the process of direct learning experience on assignment will give benefit to the organization or institution where they work. The experimental learning model will enhance and strengthen the relationship between education, work, and personal development.

Effectiveness

The word effectiveness is a word that is often associated with the implementation of a program. Simply put, effectiveness can be synonymous with the word "success", which means how far or how the level of success achievement of the objectives in the program. Effectiveness is often also associated with the word "quality", because an effective program also means the program can be said as qualified. Nevertheless, Creemers (1996: 21) states that the use of the word quality, will lead to obscurity, because it can include many things, including effectiveness itself.

In Oxford Advanced Learner's Dictionary, effectiveness has three meanings: (1) having the desired effect, producing the intended result, making a strong or pleasing impression, (2) having a role or position, even though not officially appointed to it, and (3) happening or coming into use (Hornby, 1995: 370). Among the three definitions, the most

appropriate definition when associated with a program is the first definition, which indicates its effectiveness with the achievement of the desired outcome or effect.

Teachers' performance

The term "performance" is a translation of the English language "performance" which means performance or work performance. Performance is the result or level of success of a person in the field of work. According to Chesterfield County Public School (2007), "teachers' performance" includes "plan instruction, implement the lesson, motivates students, communicates lesson, demonstrates knowledge of the curriculum, sets high expectations for student achievement inappropriate with needs and abilities, maximize time on task, integrate materials and methodology, plans and uses evaluative activities, provides specific evaluative feedback, manages the classroom, interacts with students, interacts with parents and community, interacts with administration and other educational personnel, regulations, policies, procedures and accepted practices". Activities describes about teachers' performance are more emphasis on classroom learning, including how teachers integrate lesson materials and methodologies to be used to motivate students, manage classes, communicate knowledge, and evaluate and follow up on learning evaluation outcomes. However, there are other activities that support classroom learning activities, such as interacting with parents and the community, interacting with administrative staff in schools and other education personnel, and most importantly engaging in activities that enhance self-development and schooling. Everything requires a high commitment from teachers to do their job.

Based on the notion of teachers' performance and activity that are related to classroom learning and other activities that support teachers' duties, what is meant by teachers' performance is achievement, which is achieved by the teachers in performing their duties during a certain period of time that is measured based on three indicators, there are: mastering the material, the ability to manage learning process and commitment to perform the task.

RESEARCH METHODS

Type and Design of Evaluation

The type of evaluation that was used in this practice was impact evaluation. This type was chosen because through the evaluation activity was expected to obtain the image of the effectiveness of training programs that was held by *PPPPTK* Mathematics, through teachers' performance and implementation of teachers' continuous professional development (CPD). The impact evaluation design was built through as illustrated in Figure 1.

The effectiveness of the training program in the context of this study was focused on 2 (two) main components, there were teachers' performance in schools and teachers' continuous professional development (CPD). Teachers' performance and teachers' continuous professional development are assumed to have an effect on the effectiveness of

training program. In this study the components are developed for measuring teachers' performance and teachers' continuous professional development are illustrated in Table 1.

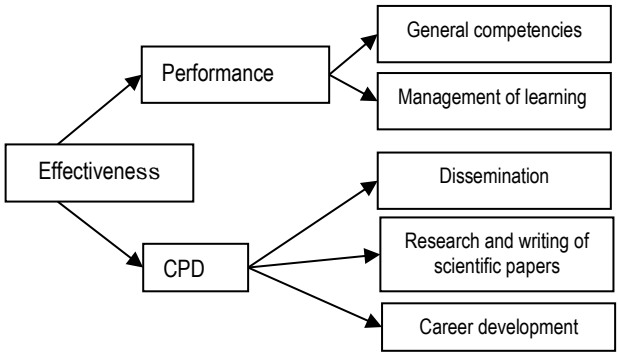

Figure 1. Model Effectiveness Of training

Table 1**.** Component, Sub-component of teachers' performance and Continuous Professional Development (CFD)

Component of teachers' performance	Sub Component
General competence	1. Academic competence 2. Social competence 3. Creativity and innovation
Management of learning	1. Preparation of learning 2. Implementation of learning 3. Assessment of learning
Dissemination	1. Preparation 2. Implementation of dissemination 3. Follow-up the coaching
Research and writing of scientific papers	1. Research planning 2. Implementation of research 3. Reporting of research results
Career Development	1. Planning of career development 2. Career development implementation 3. Career development follow up

METHODS

The evaluation approach that was uses was quantitative descriptive approach, which explained the existing phenomenon by using numbers to describe individual or group characteristics (Syamsudin & Damiyanti: 2011).

The subjects of the research evaluation were mathematics teachers of junior high school (SMP), senior high school (SMA), and vocational high school (SMK) of alumni of *PPPPTK* Mathematics training program, along with their colleagues, principals, and students were supported by alumni teachers. The evaluation subjects were 242 people, consisting of 55 mathematics teachers of training alumni of *PPPPTK* Mathematics in 2014 and 2015; 94 peer teachers, 21 principals, and 72 students.

The instruments that were used in this study were online educational evaluation questionnaire developed (EDD), including EDD1 for alumni teachers, EDD2 for colleagues, EDD3 for Principals and EDD4 for students were supported by alumni teachers. The questionnaires could be accessed by teachers through *edd.p4tkmatematika.org*

This study used quantitave data analysis. According to Sugiyono (2010:93) in the calculation of effectiveness were used scores (Likert scale), if the score was greater, it could be concluded that the management was more effective, and vice versa the smaller the result score showed the less effective management. In addition, this study also referred to the performance of government agencies, through teachers training programs. Table 2 below is criterion for determining the classification of trends and effectiveness of the questionnaire scores (Dantes modification, 2001).

Table 2. Scale and Classification Measurement of Effectiveness

Criteria	Performance
Very effective (SE)	91%-100%
Effective (E)	81%-90%
Effective enough (C)	61%-80%
Ineffective (TE)	41%-60%
Very Ineffective (STE)	Less than 40%

According to table 2, it is determined that if percentage of 91% to 100% achievement is very effective, achievement above 81% to 90% is effective, the percentage above 61% to 80% is quite effective, the percentage is above 41% to 60%, it means ineffective and the percentage less than 40% means very ineffective. *PPPPTK* Mathematics training program can be concluded to be effective if the results show an increasing percentage. In contrast, the smaller the percentage of the results indicates the less effective the program is.

Besides, the level of effectiveness, quantitatively are measured also the differences of the effectiveness before and after the training. It aims to reinforce that by the development of evaluation model of *PPPPTK* training program based on online Mathematics in the form, which can make the differences in teachers' performance level. The quantitative test is done by testing hypothesis.

Hypothesis testing in this study was determined based on the data normality test results so it could be determined what the most appropriate test equipment that was used. If the data was normally distributed then was used parametric test Paired Sample T-Test. Meanwhile, if the data was not normally distributed then was used non-parametric test, which was Wilcoxon Signed Rank Test. The two different test models were used to analyze pre-post research model or before and after the training program. Paired sample t-test was used to test the difference of two paired samples. Paired samples were defined as a sample of the same subject but undergo two different treatments in situations before and after the training process. Paired sample t-test statistic test in this research was assisted with SPSS program version 17, with the following procedure.

1. Determining the hypothesis

The hypotheses specified in the paired sample t-test are as follows:

Ho: There is no significant difference between the effectiveness level before and after the training program

Ha: There is a significant difference between effectiveness levels before and after the training program

2. Determine the level of significant by 5% or 0.05
3. Define test criteria:
   a. Ho is rejected if the value of t arithmetic> t table or Sig value. <0.05 means there is a difference
   b. Ho is accepted if the value of t arithmetic ≤t table or Sig≥ 0,05 means there is no difference.

Similarly, the Wilcoxon signed rank test is a nonparametric test that is used to analyze pair wise data due to the presence of two different treatments. Wilcoxon signed rank test is used when data is not normally distributed. The basis of the decision to accept or reject Ho in the Wilcoxon signed rank test is as follows: if the value of Sig <0,05 then Ho is rejected and Ha is accepted. If the value of Sig≥ 0,05 then Ho is accepted and Ha is rejected.

RESEARCH RESULTS AND DISCUSSION

Assessment of the effectiveness of the *PPPPTK* Mathematics training program consists of 2 components, there are teachers' performance and teachers' continuous professional development with several sub components. The assessment is divided into two, there are the effectiveness before and after the training program progresses.

Data on the effectiveness of *PPPPTK* Mathematics training program before and after the training is seen from component of teachers' performance in training program.

Table 3. Results Data of Level of Training Effectiveness (Teachers' performance)

Component	Sub- component	Level of Effectiveness			
		Before		After	
		Average	Criteria	Average	Criteria
Teachers' Continuous Professional Development competence	General Competence	54.13	TE	83.65	E
	Management of Learning	53.05	TE	85.62	E

E = Effective, TE = Ineffective

The table above shows the effectiveness of *PPPPTK* Mathematics training program that is seen from the component of teachers' performance. Effectiveness is assessed from two sub-components; there is general competence with the average before 54.130 with ineffective criteria and assessment after 83.650 average training program with effective criteria. Then the second sub-component is the management of learning before the training that is obtained averaging 53.050 with ineffective criteria and after the training program that is obtained the average of 85.620 with effective criteria. This shows that the level of

effectiveness of teachers has increased. The frequency of teachers' performance effectiveness is presented in Table 4.

Table 4. Frequency of Teachers' performance Effectiveness

Component	Sub-Component	Frequency			
		Before		After	
		Criteria	%	Criteria	%
Teachers' Continuous Professional Development Competence	General Competence	SE	0	SE	22.7
		E	0	E	33.1
		C	10.7	C	44.2
		TE	84.3	TE	0
		STE	5	STE	0
	Management of Learning	SE	0	SE	29.8
		E	0	E	36.8
		C	5.8	C	33.1
		TE	88	TE	4
		STE	5.8	STE	0

SE = Very Effective, E = Effective, C = Effective Enough, TE = Ineffective, STE = Very Ineffective

The data on the effectiveness of *PPPPTK* Mathematics training program before and after the training is seen from component of teachers' Continuous Professional Development in Table 5.

Table 5. Level of Effectiveness Training (Teachers' Continuous Professional Development)

Component	Sub- Component	Level of Effectiveness			
		Before		After	
		Average	Criteria	Average	Criteria
Teachers' Continuous Professional Development	Dissemination	51.72	TE	79.84	C
	Research and Writing of scientific papers	49.31	TE	79.22	C
	Career and professional development	48.67	TE	80.60	E

E = Effective, C = Effective Enough, TE = Ineffective

The results of the effectiveness of *PPPPTK* Mathematics training program based on component of teachers' Continuous Professional Development can be seen in Table 5. Component of Teachers' Continuous Professional Development consists of three subcomponents, first is dissemination before the training program obtained average 51.720 with ineffective criteria, and after training program obtained 79.840 with criterion quite effective. Second, research and writing of scientific papers prior to the training program that is obtained average 49.310 with ineffective criteria and after the training program that is obtained 79.220 with criteria quite effective. Third, career and professional development is achieved before the 48.670 training program with ineffective criteria and after the 80,600

average training programs with effective criteria. This concludes that there is an increase in the effectiveness of the implementation of the training program, which is seen from Teachers' Continuous Professional Development. The following table presents the frequency of effectiveness of Teachers' Continuous Professional Development (CFD).

Table 6. Frequency Level of Effectiveness of Teachers' Continuous Professional Development (CFD)

Component	Sub-component	Frequency			
		Before		After	
		Criteria	**%**	Criteria	**%**
Teachers' Continuous Professional Development	Dissemination	SE	0	SE	15.9
		E	0	E	17.1
		C	0	C	69.4
		TE	85.3	TE	0
		STE	14.7	STE	0
	Research and Writing of scientific papers	SE	0	SE	13.5
		E	0	E	17.1
		C	18.3	C	69.4
		TE	45.9	TE	0
		STE	35.3	STE	0
	Career and professional development	SE	0	SE	17.6
		E	0	E	21.2
		C	0	C	61.2
		TE	74.7	TE	0
		STE	25.3	STE	0

SE = Very Effective, E = Effective, C = Effective enoug, TE = Ineffective, STE = Very Ineffective, Ef1 = effectiveness level of training program

Overall level of effectiveness of *PPPPTK* Mathematics training program before and after teachers follow the training program, is seen in table 7.

Table 7. The whole Effectiveness Level of Training

Sub-Component	Effectiveness Level			
	Before		After	
	Average	Criteria	Average	Criteria
Ef_1	50.53	TE	9.92	C

C = Quite Effective, TE = Not Effective, Ef1 = effectiveness level of training program

Table 7 shows the average before the training program 50,530 with ineffective criteria and after the training program is obtained 79,920 with criteria quite effective. This is seen very clearly with increasing the average value makes the level of effectiveness is also more increased. The statistical evidence to test the truth of the increase in effectiveness can be seen in table. 8 as follows.

Table 8. Different Test of Effectiveness Level

Component	TCount	Sig.	Information
Ef2	42.057	0.000	Significant

The table above shows the different test statistic (paired sample program of *PPPPTK* Mathematics t-test) effectiveness level before and after the *PPPPTK* Mathematics training program takes place. The above results show that the sig value is obtained 0.000. Therefore the value of sig. smaller than alpha (0.000 <0.05), it can be concluded that it is significant. This means that there are differences in the level of effectiveness of teachers' performance before and after following the training. Furthermore, the test results on the structural model also shows that the model built to assess the success rate of teachers in implementing the results of the training in the workplace proved to be a fit model. The fit model is shown by obtaining a relatively small chi-square value of 4.998, RMSEA = 0.063 <0.08, CFI value = 0.995> 0.9, GFI value = 0.940> 0.9 and AGFI value = 0.988> 0.9 and obtain probability value 0,172.

Based on these results it can be concluded there is no difference between the sample covariance matrix and the population covariant matrix which is estimated that cannot be rejected. This means that the structural relationship model built to see the effectiveness of the *PPPPTK* Mathematics training program is seen from the component of teachers' performance and the implementation of Teachers' Continuous Professional Development (CFD) is an appropriate and acceptable model.

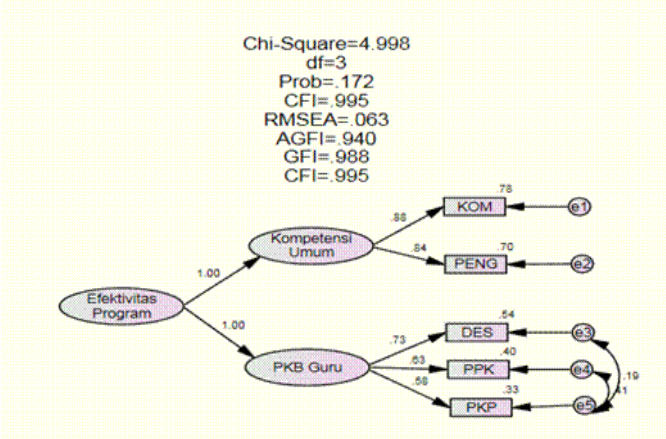

Figure 2. Effectiveness Model of *PPPPTK* Mathematics Training Program based on teachers' performance and teachers' Continuous Professional Development (CFD)

CONCLUSIONS AND SUGGESTIONS

Conclusion

Effectiveness is assessed from the main components of teachers' performance. The first component is general competence, before the training is obtained 54.130 average with ineffective criteria, assessment after training is obtained 83.650 average with effective criteria. The second component is the management of learning, before the training is obtained averaging 53.050 with ineffective criteria, and after training is obtained an average of 85.620 with effective criteria. This shows that the level of effectiveness of teachers' performance increased from before the training and after following the training.

Assessment of effectiveness level is seen from principal component of teachers' Continuous Professional Development, it can be shown that before attending training dissemination component get average 51.720 with criterion not effective, and after training is obtained mean equal to 79.840 with criteria quite effective. The research component and the writing of scientific paper before the average training of 49.310 criteria is not effective, after the average training of 79.22 criterion is quite effective. Components of career and professional development, before the average training of 48.670 criteria are not effective and after the average training 80.600 are effective criteria. Based on these results can be concluded that there is an increase in the effectiveness of the implementation of training programs seen from the component of teachers' Continuous Professional Development.

Overall, the effectiveness of *PPPPTK* Mathematics training program before and after attending the training shows an improvement. The average before attending the training is 50.530 with ineffective criteria, and after attending the training show the average of 79.920 with the criterion is quite effective.

The statistical evidence to test the truth of the effectiveness increase before and after following the training program can be shown through Table 7, with the paired sample t-test. The result shows that the sig value. It is obtained 0.000. Therefore the value of sig. smaller than alpha (0.000 <0.05), it is concluded significant. This means that there are differences in the level of effectiveness of teachers' performance before and after following the training.

The results of the structural model testing show that the program evaluation model to see the effectiveness of training program is a fit model, it is shown from the relatively small chi-square value of 4.998, RMSEA <0.08 (0.063), CFI value> 0.9 (0.995) , The GFI value> 0.9 (0.940) and the AGFI value ranges from 0.9 (0.988), and the probability is 0.172. Based on these results indicate that there is no difference between the sample covariance matrix and the estimated population covariance matrix cannot be rejected. This means that the evaluation model of the training program to assess the effectiveness of the *PPPPTK* Mathematics training program (Figure 2) is an appropriate and acceptable model.

Suggestions

Based on the results of the research, several suggestions are proposed.

1. The evaluation model of *PPPPTK* Mathematics training program can be developed and adapted to the type of training that will be evaluated.
2. Specific model evaluation of training programs that use online based evaluation instruments, admin is required to manage this model. If *PPPPTK* Mathematics will implement an online based evaluation model, it is expected that Evaluation Section on Facilitation Field of Increasing Competence as its admin.

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